REMARKS

The present invention is directed to methods and apparatus for passive illumination of refueling hoses, including, for example, refueling hoses for aerial refueling systems and the like. Certain embodiments of the present invention will now be discussed in comparison to the applied references. Of course, the following discussion of these disclosed embodiments, and the differences between the disclosed embodiments and the subject matter described in the applied references, do not define the scope or interpretation of any of the claims. Instead, such discussed differences merely help the Examiner appreciate important claim distinctions discussed thereafter.

In one embodiment, a conduit for transferring a flowable material includes a wall member at least partially enclosing an inner region. The inner region is adapted to receive the flowable material and to facilitate transfer of the flowable material from a first location to a second location. A plurality of reflective members are at least one of formed within an outer layer of the wall member and disposed on an outer surface of the wall member. The reflective members are disposed in at least one substantially continuous annular band about the wall member, and adapted to at least partially reflect light incident thereon. Apparatus in accordance with the present invention may advantageously provide improved visibility of refueling hoses for aerial refueling operations during daytime and night, without requiring the provision of electrical power or moving parts. Thus, the efficiency, safety, and reliability of aerial refueling operations may be improved.

Von Thal (U.S. 6,651,933 B1)

Von Thal teaches a boom load alleviation system for refueling an aircraft. As best shown in Figure 2A, a refueling boom 14 includes a fixed tube 16 and an extendible boom 18. (3:26-28). A plurality of discrete targeting sights 33 are positioned at discrete locations at a mid-length position, and another plurality of discrete targeting sights 32 are positioned at discrete locations at an end position, on the extendible boom 18. (4:14-17). The target sights 32, 33 may be reflectors, a reflective material, or a set of painted emblems, or spots that provide reflectance in both the visible and infrared (IR) wavelengths. (4:58-63). According to von Thal, a digital

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camera 34 (Figure 3) is trained on the refueling boom 14, and monitors a bending deflection of the refueling boom 14 by recording changes in the X and Y coordinates of the target sights 32, 33. (5:31-63). A computer then calculates the amount of deflection of the refueling boom 14 based on the movement of the target sights 32, 33, and actuates appropriate control valves to reduce or otherwise correct the deflection. (5:63-6:2).

Applicant respectfully submits that Von Thal fails to disclose, teach, or fairly suggest Applicant's invention. More specifically, Von Thal fails to teach or fairly suggest a conduit for transferring a flowable material that includes a wall member, and a plurality of reflective members *disposed in at least one substantially continuous annular band about the wall member*. On the contrary, as shown in Figures 2A and 3, Von Thal teaches a plurality of discrete target sites 32, 33 situated on the outer surface of the refueling boom 14. According to Von Thal, the camera 34 tracks positional changes of the target sites 32, 33 and computes a deflection based thereon. Clearly, there is no teaching or suggestion in Von Thal of disposing the reflective members *in at least one substantially continuous annular band about the wall member* as taught by Applicant, because to do so would defeat the ability of the camera 34 to track the X-Y positional changes of the target sites 32, 33 that are required by Von Thal to determine the deflection of the boom 14.

Furthermore, Von Thal fails to teach or fairly suggest that the reflective members may be *formed within an outer layer of the wall member* as taught by Applicant. Von Thal specifies that the target sites 32, 33 are "disposed" on the boom 14 and may be damaged by contact with the aircraft that is being refueled. (4:53-56). Thus, Von Thal is silent regarding the possibility of forming the reflective members *within an outer layer of the wall member* as taught by Applicant, and based on the cited portions of Von Thal, clearly fails to teach or suggest this additional aspect of Applicant's invention.

Stump (U.S. 5,835,271)

Stump teaches a retroreflective element 20 that includes a plurality of layers of microspheres 22 joined by an adhesive 34. (5:4-6; Figure 1A). According to Stump, the microspheres 22 are formed of glass materials. (5:42-44).

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Stump fails to remedy the above-noted deficiencies of Von Thal. Specifically, Stump fails to disclose, teach, or fairly suggest a conduit for transferring a flowable material that includes a wall member, and a plurality of reflective members *disposed in at least one substantially continuous annular band about the wall member*. Stump also fails to teach or fairly suggest that the reflective members may be *formed within an outer layer of the wall member* as taught by Applicant.

Krispin (U.S. 5,326,052)

Krispin teaches a hose-and-drogue refueling system that includes steering thrusters disposed on the drogue. (3:62-68; Figure 1). Krispin fails to remedy the above-noted deficiencies of Von Thal. Specifically, Krispin fails to disclose, teach, or fairly suggest a conduit for transferring a flowable material that includes a wall member, and a plurality of reflective members *disposed in at least one substantially continuous annular band about the wall member*. Krispin also fails to teach or fairly suggest that the reflective members may be *formed within an outer layer of the wall member* as taught by Applicant.

I Claim Rejections – 35 USC §102

The Office Action rejected Claims 1, 3-7, 9, 10, 12-16, 18-20, 22-26, 28-31, and 33-35 under 35 USC §102(b) as being anticipated by von Thal.

Claims 1, 3-7 and 9

Turning now to the specific language of the claims, claim 1 recites a conduit for transferring a flowable material, comprising a wall member at least partially enclosing an inner region, the inner region being adapted to receive the flowable material and to facilitate transfer of the flowable material from a first location to a second location; and a plurality of reflective members being at least one of *formed within an outer layer of the wall member* and disposed on an outer surface of the wall member, *the reflective members being disposed in at least one*

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substantially continuous annular band about the wall member and adapted to at least partially reflect light incident thereon. (emphasis added).

As described above, von Thal fails to disclose, teach, or fairly suggest the apparatus recited in claim 1. Specifically, von Thal fails to teach or fairly suggest a conduit that includes a plurality of reflective members *disposed in at least one substantially continuous annular band about the wall member*. On the contrary, as shown in Figures 2A and 3, von Thal teaches a plurality of discrete target sites 32, 33 situated on the outer surface of the refueling boom 14 that are tracked by the camera 34. Also, von Thal fails to teach or fairly suggest that the reflective members may be *formed within an outer layer of the wall member* as taught by Applicant. Von Thal is silent regarding the possibility of forming the reflective members *within an outer layer of the wall member* as taught by Applicant, and clearly fails to teach or suggest this additional aspect of Applicant's invention. Therefore, claim 1 is not anticipated by, and is allowable over, von Thal.

Claims 3-7 and 9 depend from claim 1 and are patentable over von Thal for the same reasons as claim1 and also due to additional limitations contained in those claims. For example, claim 3 recites the conduit of Claim 1, wherein the wall member includes a first portion and a second portion, the first portion having a first concentration of reflective members and the second portion having a second concentration of reflective members. Claim 5 recites the conduit of Claim 3, wherein the second portion of the wall member is adapted to be inserted into a receiving receptacle of an aerial refueling system, and *wherein the second portion includes the substantially continuous annular band disposed about the wall member at a location corresponding to a minimum insertion length of the second portion into the receiving receptacle for proper operation of the aerial refueling system.* (emphasis added). Similarly, claim 6 recites the conduit of Claim 3, wherein the second portion of the wall member is adapted to be inserted into a receiving receptacle of an aerial refueling system, and *wherein the second portion includes the substantially continuous annular band disposed about the wall member at a location corresponding to a maximum insertion length of the second portion into the receiving receptacle for proper operation of the aerial refueling system.* (emphasis added). These additional limitations are also not disclosed, taught, or fairly suggested by von Thal.

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Claim 10, 12-16, and 18-19

Similarly, claim 10 recites an apparatus for transferring a flowable material, comprising a tank adapted to contain a flowable material; a conduit operatively coupled to the tank and adapted to receive the flowable material and to facilitate transfer of the flowable material between the tank and a second location, the conduit including a wall member; and a plurality of reflective members being at least one of *formed within an outer layer of the wall member* and disposed on an outer surface of the wall member, the reflective members being *disposed in at least one substantially continuous annular band about the wall member* and adapted to at least partially reflect light incident thereon. (emphasis added).

As described above, von Thal fails to disclose, teach, or fairly suggest the apparatus recited in claim 10. Specifically, von Thal fails to teach or fairly suggest an apparatus that includes a conduit having a plurality of reflective members *disposed in at least one substantially continuous annular band about the wall member*. On the contrary, as shown in Figures 2A and 3, von Thal teaches a plurality of discrete target sites 32, 33 situated on the outer surface of the refueling boom 14 that are tracked by the camera 34. Also, von Thal fails to teach or fairly suggest that the reflective members may be *formed within an outer layer of the wall member* as taught by Applicant. Von Thal is silent regarding the possibility of forming the reflective members *within an outer layer of the wall member* as taught by Applicant, and clearly fails to teach or suggest this additional aspect of Applicant's invention. Therefore, claim 10 is not anticipated by, and is allowable over, von Thal.

Claims 12-16, and 18-19 depend from claim 10 and are patentable over von Thal for the same reasons as claim 10 and also due to additional limitations contained in those claims. For example, claim 12 recites the apparatus of Claim 10, wherein the wall member includes a first portion and a second portion, the first portion having a first concentration of reflective members and the second portion having a second concentration of reflective members. Claim 14 recites the apparatus of Claim 12, wherein the apparatus includes an aerial refueling system, wherein the second portion of the wall member is adapted to be inserted into a receiving receptacle of the aerial refueling system, and *wherein the second portion includes the substantially continuous annular band disposed about the wall member at a location corresponding to a minimum insertion length of the second portion into the receiving receptacle for proper operation of the*

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aerial refueling system. (emphasis added). Similarly, claim 15 recites the apparatus of Claim 12, wherein the apparatus includes an aerial refueling system, wherein the second portion of the wall member is adapted to be inserted into a receiving receptacle of the aerial refueling system, and *wherein the second portion includes the substantially continuous annular band disposed about the wall member corresponding to a maximum insertion length of the second portion into the receiving receptacle for proper operation of the aerial refueling system.* (emphasis added). These additional limitations are also not taught or fairly suggested by von Thal.

Claims 20, 22-26, and 28-29

Claim 20 recites an aircraft, comprising a fuselage; a propulsion system operatively coupled to the fuselage; and an aerial refueling system coupled to the fuselage and including a tank adapted to contain a flowable material; a conduit operatively coupled to the tank and being adapted to receive the flowable material and to facilitate transfer of the flowable material between the tank and a second location, the conduit including a wall member; and a plurality of reflective members being at least one of *formed within an outer layer of the wall member* and disposed on an outer surface of the wall member, the reflective members being *disposed in at least one substantially continuous annular band about the wall member* and adapted to at least partially reflect light incident thereon. (emphasis added).

As described above, von Thal fails to disclose, teach, or fairly suggest the apparatus recited in claim 20. Specifically, von Thal fails to teach or fairly suggest an apparatus that includes a conduit having a plurality of reflective members *disposed in at least one substantially continuous annular band about the wall member.* On the contrary, as shown in Figures 2A and 3, von Thal teaches a plurality of discrete target sites 32, 33 situated on the outer surface of the refueling boom 14 that are tracked by the camera 34. Also, von Thal fails to teach or fairly suggest that the reflective members may be *formed within an outer layer of the wall member* as taught by Applicant. Von Thal is silent regarding the possibility of forming the reflective members *within an outer layer of the wall member* as taught by Applicant, and clearly fails to teach or suggest this additional aspect of Applicant's invention. Therefore, claim 20 is not anticipated by, and is allowable over, von Thal.

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Claims 22-26, and 28-29 depend from claim 20 and are patentable over von Thal for the same reasons as claim 20 and also due to additional limitations contained in those claims. More specifically, claim 22 recites the aircraft of Claim 20, wherein the wall member includes a first portion and a second portion, the first portion having a first concentration of reflective members and the second portion having a second concentration of reflective members. Claim 24 recites the aircraft of Claim 22, wherein the apparatus includes an aerial refueling system, wherein the second portion of the wall member is adapted to be inserted into a receiving receptacle of the aerial refueling system, and *wherein the second portion includes the substantially continuous annular band disposed about the wall member at a location corresponding to a minimum insertion length of the second portion into the receiving receptacle for proper operation of the aerial refueling system.* (emphasis added). Similarly, claim 25 recites the aircraft of Claim 22, wherein the apparatus includes an aerial refueling system, wherein the second portion of the wall member is adapted to be inserted into a receiving receptacle of the aerial refueling system, and *wherein the second portion includes the substantially continuous annular band disposed about the wall member at a location corresponding to a maximum insertion length of the second portion into the receiving receptacle for proper operation of the aerial refueling system.* (emphasis added). These additional limitations are also not taught or fairly suggested by the cited references.

Claims 30-31 and 33-35

Claim 30 recites a method of transferring a flowable material, comprising providing a conduit operatively coupled to a tank containing the flowable material, the conduit being adapted to receive the flowable material and to facilitate transfer of the flowable material between the tank and a second location, the conduit including a wall member having a plurality of reflective members being at least one of formed within an outer layer of the wall member and disposed on an outer surface of the wall member, *the reflective members being disposed in at least one substantially continuous annular band about the conduit*; illuminating the at least some reflective members with an incident light; reflecting the incident light using the at least some reflective

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members; and transferring the flowable material through the conduit from the tank to the second location. (emphasis added).

As described above, von Thal fails to disclose, teach, or fairly suggest the method recited in claim 30. Specifically, von Thal fails to teach or fairly suggest an apparatus that includes a conduit having a plurality of reflective members *disposed in at least one substantially continuous annular band about the wall member*. On the contrary, as shown in Figures 2A and 3, von Thal teaches a plurality of discrete target sites 32, 33 situated on the outer surface of the refueling boom 14 that are tracked by the camera 34. Also, von Thal fails to teach or fairly suggest that the reflective members may be *formed within an outer layer of the wall member* as taught by Applicant. Von Thal is silent regarding the possibility of forming the reflective members *within an outer layer of the wall member* as taught by Applicant, and clearly fails to teach or suggest this additional aspect of Applicant's invention. Therefore, claim 30 is not anticipated by, and is allowable over, von Thal.

Claims 31 and 33-35 depend from claim 30 and are patentable over von Thal for the same reasons as claim 30 and also due to additional limitations contained in those claims. More specifically, claim 33 recites the method of Claim 32, wherein providing a conduit including a wall member having a plurality of reflective members includes providing a conduit including a wall member having a first portion and a second portion, the first portion having a first concentration of reflective members and the second portion having a second concentration of reflective members, wherein the second portion of the wall member is adapted to be inserted into a receiving receptacle of an aerial refueling system, and *wherein the second portion includes the substantially continuous annular band disposed about the wall member at a location corresponding to a minimum insertion length of the second portion into the receiving receptacle for proper operation of the aerial refueling system.* (emphasis added). These additional limitations are also not disclosed, taught, or fairly suggested by the cited reference.

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II. Claim Rejections – 35 USC §103(a)

The Office Action rejected Claims 2, 11, 21, and 32 under 35 USC §103(a) as being unpatentable over von Thal in view of Stump, and also rejected Claims 8, 17, and 27 under 35 USC §103(a) as being unpatentable over von Thal in view of Krispin.

For the reasons set forth more fully above, the above-noted absent teachings of von Thal are not remedied by the teachings of Stump and Krispin. Therefore, claims 2, 8, 11, 17, 21, 27, 32, and 35 are not disclosed, taught, or fairly suggested by the combination of von Thal, Stump, and Krispin. Therefore, claims 2, 8, 11, 17, 21, 27, 32, and 35 are allowable over these cited references for the reasons set forth above.

III. Claim Rejections – 35 USC §112

The Office Action rejected Claims 5, 6, 14, 15, 24, and 25 under 35 USC §119, ¶2, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicant has amended claims 5, 6, 14, 15, 24, and 25 to better point out and distinctly claim the subject matter which Applicant regards as the invention. In view of the foregoing amendments, Applicant therefore respectfully requests reconsideration and withdrawal of these rejections.

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CONCLUSION

Based on the foregoing amendments and remarks, Applicant respectfully requests reconsideration and withdrawal of the rejections and objections to Claims 1-35, and allowance of all of the pending Claims 1-35. If there are any matters that may be handled by telephone discussion, the Examiner is kindly requested to telephone the undersigned at his convenience.

Respectfully submitted,

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MAIL CERTIFICATE

I hereby certify that this communication is being deposited with the United States Postal Service via first class mail under 37 C.F.R. § 1.08 on the date indicated below addressed to: **MAIL STOP: NON-FEE AMENDMENT**, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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